WHAT IS CLAIMED IS:

1. An exposure method, characterized in that one and the same mask pattern is projected onto a common exposure region in accordance with bright-field illumination, with a constant exposure wavelength, while changing an illumination condition.

2. An exposure method, characterized in that one and the same mask pattern is projected onto a common exposure region in accordance with bright-field illumination under small σ and large σ.

3. An exposure method, characterized in that one and the same mask pattern is projected onto a common exposure region in accordance with bright-field illumination, with a small numerical aperture NA and a large numerical aperture NA.

4. An exposure method, characterized in that one and the same mask pattern is projected onto a common exposure region in accordance with bight-field oblique illumination and bright-field perpendicular illumination.

5. A method according to any one of Claims 1 - 4, wherein the mask pattern includes an opening pattern with a linewidth not greater than a resolution

limit of an exposure apparatus to be used.

6. A method according to Claim 5, wherein there are plural opening patterns juxtaposed with each other.

7. A method according to Claim 5, wherein the mask pattern includes a phase shift pattern.

8. A method according to Claim 5, wherein there is an auxiliary pattern disposed adjacent to the opening pattern.

9. A method according to any one of Claims 1 - 4 wherein the mask pattern is illuminated light from one of KrF excimer laser, ArF excimer laser and F_2 excimer laser.

10. A method according to any one of Claims 1 - 4 wherein the mask pattern is projected by use of a projection optical system comprising one of a dioptric system, a catadioptric system and a catoptric system.

11. A method according to any one of Claims 1 - 4 wherein exposures of the exposure region under different illumination conditions are performed sequentially without a development process to the

exposure region.

12. A method according to any one of Claims 1 - ~~10~~ 4, wherein exposures of the exposure region under different illumination conditions are performed simultaneously without mutual interference of lights in the different illumination conditions.

13. An exposure apparatus, characterized by an exposure mode in which one and the same mask pattern is projected onto a common exposure region in accordance with bright-field illumination, with a constant exposure wavelength, while changing an illumination condition.

14. An exposure apparatus, characterized by an exposure mode in which one and the same mask pattern is projected onto a common exposure region in accordance with bright-field illumination under small σ and large σ.

15. An exposure apparatus, characterized by an exposure mode in which one and the same mask pattern is projected onto a common exposure region in accordance with bright-field illumination, with a small numerical aperture NA and a large numerical aperture NA.

16. An exposure apparatus, characterized by an exposure mode in which one and the same mask pattern is projected onto a common exposure region in accordance with bight-field oblique illumination and bright-field perpendicular illumination.

17. An apparatus according to any one of Claims 14 - 16, wherein the mask pattern includes an opening pattern with a linewidth not greater than a resolution limit of an exposure apparatus to be used.

18. An apparatus according to Claim 17, wherein there are plural opening patterns juxtaposed with each other.

19. An apparatus according to Claim 17, wherein the mask pattern includes a phase shift pattern.

20. An apparatus according to Claim 17, wherein there is an auxiliary pattern disposed adjacent to the opening pattern.

21. An apparatus according to any one of Claims 13 - ~~20~~ 16, wherein the mask pattern is illuminated light from one of KrF excimer laser, ArF excimer laser and F_2 excimer laser.

22. An apparatus according to any one of Claims 13 - ~~20~~ 16 wherein the mask pattern is projected by use of a projection optical system comprising one of a dioptric system, a catadioptric system and a catoptric system.

23. An apparatus according to any one of Claims 13 - ~~22~~ 16, wherein exposures of the exposure region under different illumination conditions are performed sequentially without a development process to the exposure region.

24. An apparatus according to any one of Claims 13 - ~~22~~ 16, wherein exposures of the exposure region under different illumination conditions are performed simultaneously without mutual interference of lights in the different illumination conditions.

25. A device manufacturing method, comprising the steps of:

exposing a wafer to a device pattern by use of an exposure apparatus as recited in any one of Claims 13 - ~~24~~ 16; and

developing the exposed wafer.

26. An exposure method, characterized in that one

and the same mask pattern is projected onto a common exposure region through illumination while changing an illumination condition and a spatial frequency passage spectrum of a projection optical system.

27. An exposure method, characterized in that one and the same mask pattern is projected onto a common exposure region through illumination under small σ and large σ, while changing a spatial frequency passage spectrum of a projection optical system.

28. An exposure method, characterized in that one and the same mask pattern is projected onto a common exposure region through illumination with a small numerical aperture NA and a large numerical aperture NA, while changing a spatial frequency passage spectrum of a projection optical system.

29. An exposure method, characterized in that one and the same mask pattern is projected onto a common exposure region through oblique illumination and perpendicular illumination, while changing a spatial frequency passage spectrum of a projection optical system.

30. A method according to any one of Claims 26 - 29, wherein the mask pattern includes an opening

pattern with a linewidth not greater than a resolution limit of an exposure apparatus to be used.

31. A method according to Claim 30, wherein there are plural opening patterns juxtaposed with each other.

32. A method according to Claim 30, wherein the mask pattern includes a phase shift pattern.

33. A method according to any one of Claims 26 - 29, wherein one of a shape of an aperture opening of the projection optical system and a transmission factor distribution is changed to change the spatial frequency passage spectrum of the projection optical system.

34. A method according to any one of Claims 26 - 29, wherein the mask pattern is illuminated light from one of KrF excimer laser, ArF excimer laser and F_2 excimer laser.

35. A method according to any one of Claims 26 - 29, wherein the mask pattern is projected by use of a projection optical system comprising one of a dioptric system, a catadioptric system and a catoptric system.

36. A method according to any one of Claims 26 - ~~34~~ 29, wherein exposures of the exposure region under different illumination conditions are performed sequentially without a development process to the exposure region.

37. A method according to any one of Claims 26 - ~~35~~ 29, wherein exposures of the exposure region under different illumination conditions are performed simultaneously without mutual interference of lights in the different illumination conditions.

38. An exposure apparatus, characterized by an exposure mode in which one and the same mask pattern is projected onto a common exposure region through illumination while changing an illumination condition and a spatial frequency passage spectrum of a projection optical system.

39. An exposure apparatus, characterized by an exposure mode in which one and the same mask pattern is projected onto a common exposure region through illumination under small σ and large σ, while changing a spatial frequency passage spectrum of a projection optical system.

40. An exposure apparatus, characterized by an

exposure mode in which one and the same mask pattern is projected onto a common exposure region through illumination with a small numerical aperture NA and a large numerical aperture NA, while changing a spatial frequency passage spectrum of a projection optical system.

41. An exposure apparatus, characterized by an exposure mode in which one and the same mask pattern is projected onto a common exposure region through oblique illumination and perpendicular illumination, while changing a spatial frequency passage spectrum of a projection optical system.

42. An apparatus according to any one of Claims 39 - 41, wherein the mask pattern includes an opening pattern with a linewidth not greater than a resolution limit of an exposure apparatus to be used.

43. An apparatus according to Claim 42, wherein there are plural opening patterns juxtaposed with each other.

44. An apparatus according to Claim 42, wherein the mask pattern includes a phase shift pattern.

45. An apparatus according to any one of Claims

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~~37~~ - 41, wherein one of a shape of an aperture opening of the projection optical system and a transmission factor distribution is changed to change the spatial frequency passage spectrum of the projection optical system.

46. An apparatus according to any one of Claims 41
38 - ~~45~~, wherein the mask pattern is illuminated light from one of KrF excimer laser, ArF excimer laser and F_2 excimer laser.

47. An apparatus according to any one of Claims 41
38 - ~~45~~, wherein the mask pattern is projected by use of a projection optical system comprising one of a dioptric system, a catadioptric system and a catoptric system.

48. An apparatus according to any one of Claims 39 41
~~37~~ - ~~47~~, wherein exposures of the exposure region under different illumination conditions are performed sequentially without a development process to the exposure region.

49. An apparatus according to any one of Claims 41
38 - ~~47~~, wherein exposures of the exposure region under different illumination conditions are performed simultaneously without mutual interference of lights

in the different illumination conditions.

50. A device manufacturing method, comprising the steps of:

exposing a wafer to a device pattern by use of an exposure apparatus as recited in any one of Claims 38 - ~~49~~ 41; and

developing the exposed wafer.

51. An exposure method, characterized in that one and the same mask pattern having a predetermined pattern with an auxiliary pattern annexed thereto, is projected onto a common exposure region through illumination, while changing an illumination condition.

52. An exposure method characterized in that one and the same mask pattern having a predetermined pattern with an auxiliary pattern annexed thereto, is projected onto a common exposure region through illumination under small σ and large σ.

53. An exposure method, characterized in that one and the same mask pattern having a predetermined pattern with an auxiliary pattern annexed thereto, is projected onto a common exposure region through illumination, with a small numerical aperture NA and a

large numerical aperture NA.

54. An exposure method, characterized in that one and the same mask pattern having a predetermined pattern with an auxiliary pattern annexed thereto, is projected onto a common exposure region through oblique illumination and perpendicular illumination.

55. A method according to any one of Claims 51 - 54, wherein the mask pattern includes an opening pattern with a linewidth not greater than a resolution limit of an exposure apparatus to be used.

56. A method according to Claim 55, wherein there are plural opening patterns juxtaposed with each other.

57. A method according to Claim 55, wherein the mask pattern includes a phase shift pattern.

58. A method according to Claim 55, wherein there is an auxiliary pattern disposed adjacent to the opening pattern.

59. A method according to any one of Claims 51 - ~~58~~ 54, wherein the mask pattern is illuminated light from one of KrF excimer laser, ArF excimer laser and F_2

excimer laser.

60. A method according to any one of Claims 51 - ~~58~~ 58 wherein the mask pattern is projected by use of a projection optical system comprising one of a dioptric system, a catadioptric system and a catoptric system.

61. A method according to any one of Claims 51 - ~~60~~ 54 wherein exposures of the exposure region under different illumination conditions are performed sequentially without a development process to the exposure region.

62. A method according to any one of Claims 51 - ~~60~~ 54 wherein exposures of the exposure region under different illumination conditions are performed simultaneously without mutual interference of lights in the different illumination conditions.

63. An exposure apparatus, characterized by an exposure mode in which one and the same mask pattern having a predetermined pattern with an auxiliary pattern annexed thereto, is projected onto a common exposure region through illumination, while changing an illumination condition.

64. An exposure apparatus, characterized by an

exposure mode in which one and the same mask pattern having a predetermined pattern with an auxiliary pattern annexed thereto, is projected onto a common exposure region through illumination under small σ and large σ.

65. An exposure apparatus, characterized by an exposure mode in which one and the same mask pattern having a predetermined pattern with an auxiliary pattern annexed thereto, is projected onto a common exposure region through illumination, with a small numerical aperture NA and a large numerical aperture NA.

66. An exposure apparatus, characterized by an exposure mode in which one and the same mask pattern having a predetermined pattern with an auxiliary pattern annexed thereto, is projected onto a common exposure region through oblique illumination and perpendicular illumination.

67. An apparatus according to any one of Claims 64 - 66, wherein the mask pattern includes an opening pattern with a linewidth not greater than a resolution limit of an exposure apparatus to be used.

68. An apparatus according to Claim 67, wherein

there are plural opening patterns juxtaposed with each other.

69. An apparatus according to Claim 67, wherein the mask pattern includes a phase shift pattern.

70. An apparatus according to Claim 67, wherein there is an auxiliary pattern disposed adjacent to the opening pattern.

71. An apparatus according to any one of Claims 63 - ~~70~~ 66, wherein the mask pattern is illuminated light from one of KrF excimer laser, ArF excimer laser and F_2 excimer laser.

72. An apparatus according to any one of Claims 63 - ~~70~~ 66, wherein the mask pattern is projected by use of a projection optical system comprising one of a dioptric system, a catadioptric system and a catoptric system.

73. An apparatus according to any one of Claims 62 - ~~72~~ 66, wherein exposures of the exposure region under different illumination conditions are performed sequentially without a development process to the exposure region.

74. An apparatus according to any one of Claims 63 - ~~72~~ 66, wherein exposures of the exposure region under different illumination conditions are performed simultaneously without mutual interference of lights in the different illumination conditions.

75. A device manufacturing method, comprising the steps of:

exposing a wafer to a device pattern by use of an exposure apparatus as recited in any one of Claims 63 - ~~74~~ 66; and

developing the exposed wafer.

76. An exposure method wherein an illumination region of a predetermined shape is illuminated through an illumination optical system and with exposure light from light source means and wherein a pattern of a mask provided at the illumination region is projected by a projection optical system onto a photosensitive substrate, characterized in that the mask has a repetition pattern comprising repeatedly disposed plural basic patterns constituted by light transmissive portions, that adjacent light transmissive portions of the repetition pattern have a mutual optical phase difference of about 180 deg., and that the photosensitive substrate is exposed to the mask pattern through multiple exposures while

changing an illumination condition of the illumination optical system and a light passage condition of a pupil plane of the projection optical system.

77. A method according to Claim 76, wherein the basic pattern comprises a pair of transmissive patterns, wherein corresponding light transmissive portions of the pair of transmissive patterns have a mutual optical phase difference of about 180 deg.

78. A method according to Claim 76, wherein, as one illumination condition, approximately coherent illumination with a small effective light source is used.

79. A method according to Claim 76, wherein one light passage condition of the pupil plane of the projection optical system is limiting a passage region by use of an aperture stop having an elongated opening, extending in a direction in which pattern resolution is high.

80. A method according to Claim 79, wherein the aperture stop is provided with a plurality of movable light blocking blades which are inserted into the projection optical system upon switching of the multiple exposures.

81. A method according to Claim 76, wherein the illumination condition is changed upon switching of multiple exposures by use of illumination stop holding means having plural illumination stops one of which can be detachably inserted into a light path of the illumination optical system.

82. A method according to Claim 76, wherein there are a light blocking plate having at least one opening and holding means for the light blocking plate, and wherein the illumination condition is changed by use of light blocking plate rotating means for rotationally moving the light blocking plate within the illumination optical system, upon switching of the multiple exposures.

83. An exposure apparatus, characterized by transferring a pattern of a mask onto a photosensitive substrate in accordance with an exposure method as recited in any one of Claims 76 - 82.

84. A device manufacturing method, comprising the steps of:

printing a pattern of a mask onto a wafer in accordance with an exposure method as recited in any one of Claims 76 - 82; and

developing the exposure wafer.